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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/756,876	01/13/2004	Christian T. Goralski JR.	81044507	3427

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EXAMINER	
NGUYEN, TU MINH	
ART UNIT	**PAPER NUMBER**
3748	

MAIL DATE	DELIVERY MODE
02/20/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/756,876	GORALSKI ET AL.	
	Examiner	Art Unit	
	Tu M. Nguyen	3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 November 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 November 2007* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. An Applicant's Amendment filed on November 13, 2007 has been entered. Claim 15 has been canceled; and claims 1, 2, and 8 have been amended. Overall, claims 1-14 are pending in this application.

Drawings

2. The formal drawings filed on October 13, 2007 have been approved for entry.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office Action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1 and 3-6 are rejected under 35 U.S.C. 102(b) as being anticipated by Yonekura et al. (U.S. Patent 6,345,498).

Re claim 1, as shown in Figures 1, 12, and 13, Yonekura et al. disclose a method for controlling an engine having an exhaust with an emission control device (18) adapted for storing NOx during lean operating conditions, and converting at least a portion of the NOx during stoichiometric or rich operating conditions, the method comprising:

- operating (step 107 with Yes answer and steps 108, 109, 112-115) the engine to produce a lean exhaust gas mixture fed to the emission control device; and

- after the lean operation, operating (step 115 with Yes answer, step 116, and Figure 15) the engine to produce a rich exhaust gas mixture fed to the emission control device, the rich exhaust gas mixture having a rich air-fuel ratio, wherein the rich air-fuel ratio is selected as a function of at least the oxygen storage capacity of the device (when a storage capacity of NOx or oxygen is lowered due to deterioration of the device, an air-fuel ratio is made less rich during a rich operation (see at least the Abstract and lines 13-22 of column 3)).

Re claim 3, in the method of Yonekura et al., as oxygen storage capacity of the device decreases, the rich air-fuel ratio becomes less rich (see above).

Re claim 4, in the method of Yonekura et al., the rich air-fuel ratio is selected to provide a select amount of CO and hydrogen.

Re claims 5-6, in the method of Yonekura et al., the oxygen storage capacity of the device is determined based on device degradation, wherein the device degradation is based on an amount of sulfur contaminating the device.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yonekura et al. as applied to claim 1 above, in view of Kakuyama et al. (U.S. Patent 6,619,032).

In the method of Yonekura et al., a NOx or oxygen storage capacity of the device (18) is based on measured transition time from rich to lean (see Figure 16(A)). Thus, Yonekura et al. fail to disclose that the oxygen storage capacity of the device is estimated based on a temperature of the device. In this way, the rich air-fuel ratio is further based on temperature of the device. Also, Yonekura et al. fail to disclose that the oxygen storage capacity of the device is based on an average of several rich to lean transition times.

As shown in Figure 1, Kakuyama et al. disclose an engine air-fuel ratio control based on an amount of oxygen stored in a catalytic converter device (3). As depicted in Figure 3 and indicated in the Abstract, lines 52-57 of column 5, and line 62 of column 7 to line 10 of column 8, Kakuyama et al. teach that it is conventional in the art to estimate an oxygen storage capacity of the device is estimated based on a temperature of the device; and that the oxygen storage capacity of the device is estimated based on an average of several rich to lean transition times. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the teaching by Kakuyama et al. in the method of Yonekura et al., since the use thereof would have been routinely practiced by those with ordinary skill in the art to control an engine air-fuel ratio based on a storage capacity of an emission control device.

7. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yonekura et al. as applied to claim 1 above, in view of Sawada et al. (U.S. Patent 5,970,707).

In the method of Yonekura et al., the NOx or oxygen storage capacity of the device is determined from lean to rich transition time. Thus, Yonekura et al. fail to disclose that the oxygen storage capacity of the device is determined from rich to lean transition time.

As shown in Figure 1, Sawada et al. disclose an engine air-fuel ratio control based on an amount of oxygen stored in a NOx trap (7). As depicted in Figures 6 and 13, Sawada et al. teach that it is conventional in the art to measure a rich to lean transition time (TSTL) (see Figure 6), which is then used in the routine in Figure 13 to compute a storage capacity (CATDOS) of the NOx trap. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the teaching by Sawada et al. in the method of Yonekura et al., since the use thereof would have been routinely practiced by those with ordinary skill in the art to accurately determine a working condition of a NOx trap.

8. Claims 8-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yonekura et al. in view of Sawada et al. and Kakuyama et al.

Re claim 8, as shown in Figures 1, 12, and 13, Yonekura et al. disclose a method for controlling an engine having an exhaust with an emission control device (18) adapted for storing NOx during lean operating conditions, and converting at least a portion the NOx during stoichiometric or rich operating conditions, the method comprising:

- operating (step 107 with Yes answer and steps 108, 109, 112-115) the engine to produce a lean exhaust gas mixture fed to the emission control device;

- estimating an amount of NOx release based on engine operating conditions (i.e., engine speed and intake air amount (see Figure 6 (B)); and

- after the lean operation, operating (step 115 with Yes answer, step 116, and Figure 15) the engine to produce a rich exhaust gas mixture fed to the emission control device, the rich air-fuel ratio is determined based at least on an amount of oxygen storage capacity of the device (when a storage capacity of NOx or oxygen is lowered due to deterioration of the device, an air-

fuel ratio is made less rich during a rich operation (see at least the Abstract and lines 13-22 of column 3)).

Yonekura et al., however, fail to disclose that instead of engine operating conditions, the amount of NOx released from the device is estimated based on an oxygen storage capacity of the device; and that the oxygen storage capacity of the device is based on an average of several rich to lean transition times.

As shown in Figure 1, Sawada et al. disclose an engine air-fuel ratio control based on an amount of oxygen stored in a NOx trap device (7). As indicated on lines 6-21 of column 11, Sawada et al. teach that for every mole of NOx stored or released in the device, the device also stores or releases 0.75 mole of oxygen. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the teaching by Sawada et al. in the method of Yonekura et al., since the use thereof would have been routinely practiced by those with ordinary skill in the art to control an engine air-fuel ratio based on a storage capacity of an emission control device.

As shown in Figure 1, Kakuyama et al. disclose an engine air-fuel ratio control based on an amount of oxygen stored in a catalytic converter device (3). As depicted in Figure 3 and indicated in the Abstract, lines 52-57 of column 5, and line 62 of column 7 to line 10 of column 8, Kakuyama et al. teach that it is conventional in the art to estimate an oxygen storage capacity of the device is estimated based on a temperature of the device; and that the oxygen storage capacity of the device is estimated based on an average of several rich to lean transition times. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the teaching by Kakuyama et al. in the method of Yonekura et al., since

the use thereof would have been routinely practiced by those with ordinary skill in the art to control an engine air-fuel ratio based on a storage capacity of an emission control device.

Re claim 9, as taught in Figure 3 of Kakuyama et al., an oxygen storage capacity of the device is estimated based on a temperature of the device. In this way, the rich air-fuel ratio is further based on temperature of the device.

Re claim 10, in the modified method of Yonekura et al., the amount of NOx release is further based on operating conditions (rich air-fuel ratio of the engine).

Re claim 11, in the modified method of Yonekura et al., as oxygen storage capacity of the device decreases, the rich air-fuel ratio becomes less rich (see claim 8 above).

Re claim 12, in the modified method of Yonekura et al., the rich air-fuel ratio is selected to provide a select amount of CO and hydrogen.

Re claims 13-14, in the modified method of Yonekura et al., the oxygen storage capacity of the device is determined based on device degradation, wherein the device degradation is based on an amount of sulfur contaminating the device.

Response to Arguments

9. Applicant's arguments with respect to the references applied in the previous Office Action have been carefully considered but they are not persuasive.

Re claim 1, in response to applicant's argument that Yonekura et al. fail to disclose the limitation of "the rich air-fuel ratio is selected as a function of at least the oxygen storage capacity of the device" (page 9 of Applicant's Amendment), the examiner respectfully disagrees.

The text on lines 8-12 of the Abstract in Yonekura et al. reads as follows: "*When the time required for a change in the output level of an air-fuel ratio sensor is shorter than a predetermined time, the time required for the change in the output level of the air-fuel ratio sensor is lengthened by reducing the rich degree at the time of the rich operation,*". Hence, based on this disclosure, Yonekura et al. reduce a degree of the rich engine air-fuel ratio when an oxidant storage capacity of the emission control device (18) becomes lowered. The oxidant storage capacity of the device in Yonekura et al. is estimated based on a time required for a change in the output level of an air-fuel ratio sensor (22) as depicted in Figures 16. Thus, Yonekura et al. clearly disclose the claim limitation in dispute.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office Action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Prior Art

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure and consists of one patent: Sindano et al. (U.S. Patent 5,602,737) further disclose a state of the art.

Communication

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Tu Nguyen whose telephone number is (571) 272-4862.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Thomas E. Denion, can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tu M. Nguyen

TMN
February 18, 2008

Tu M. Nguyen
Primary Examiner
Art Unit 3748

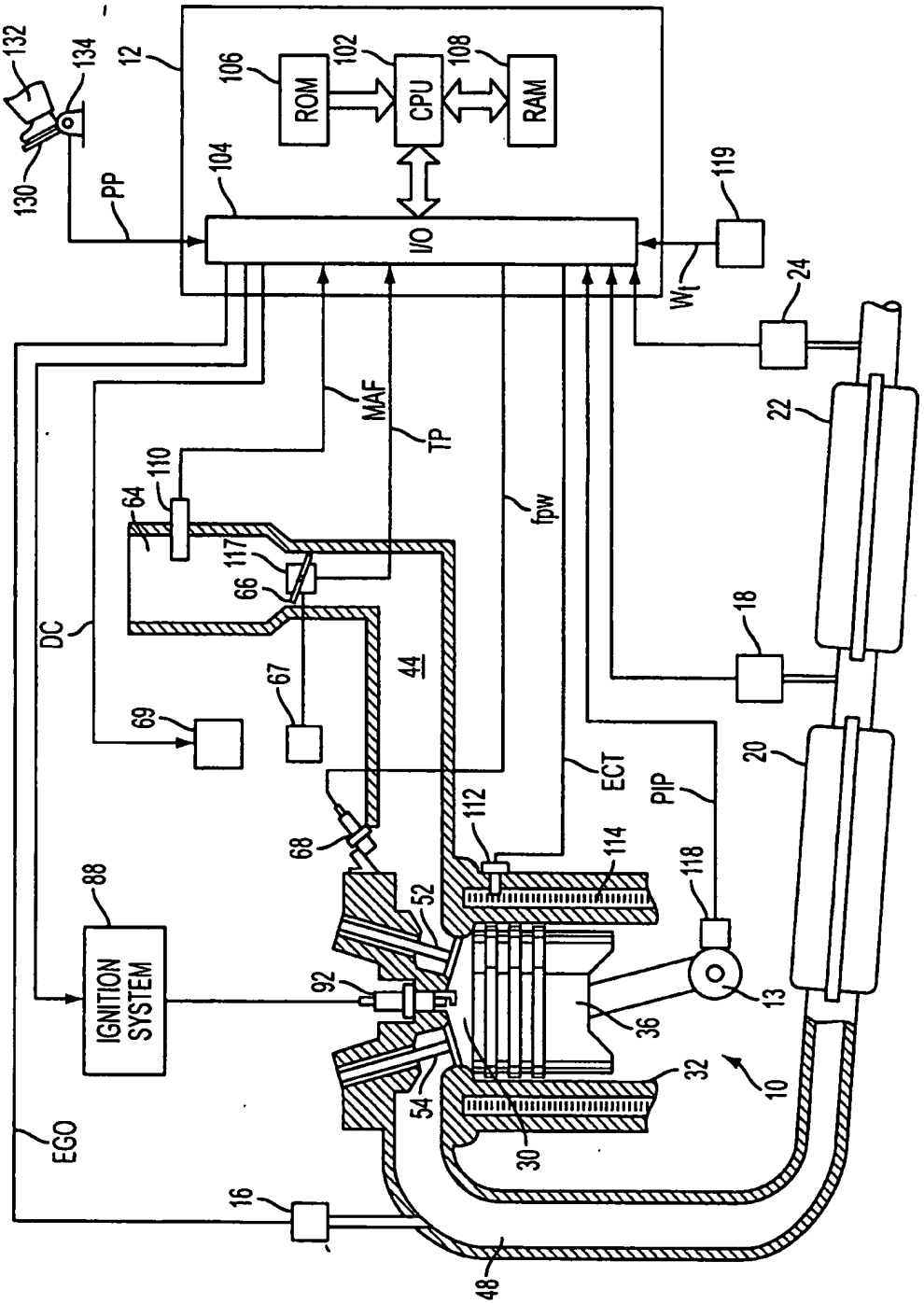

FIG. 1

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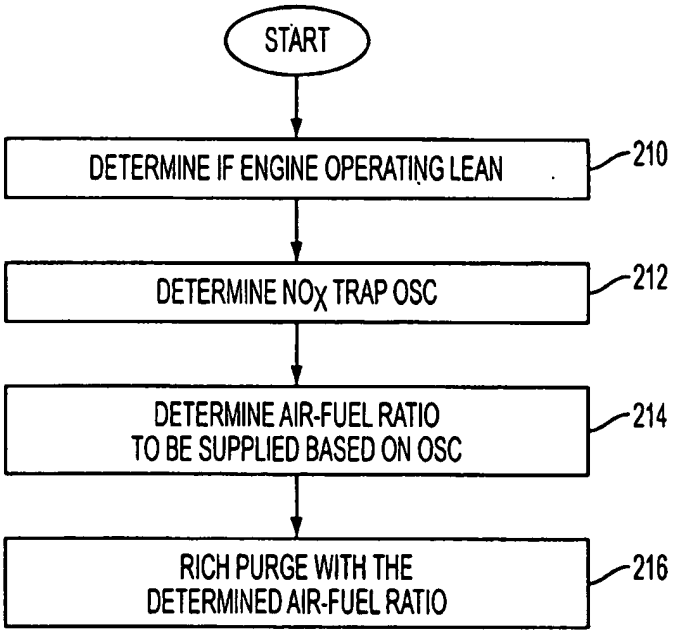

FIG. 2

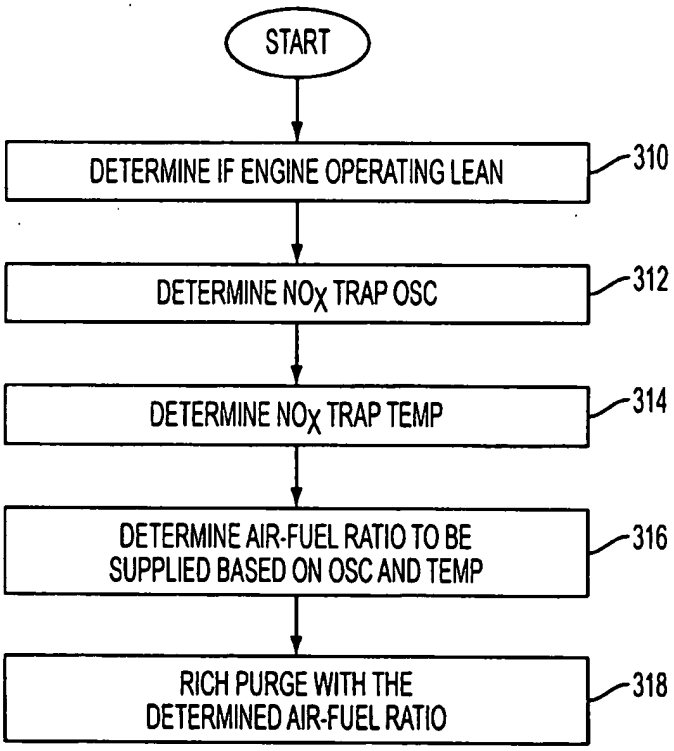

FIG. 3

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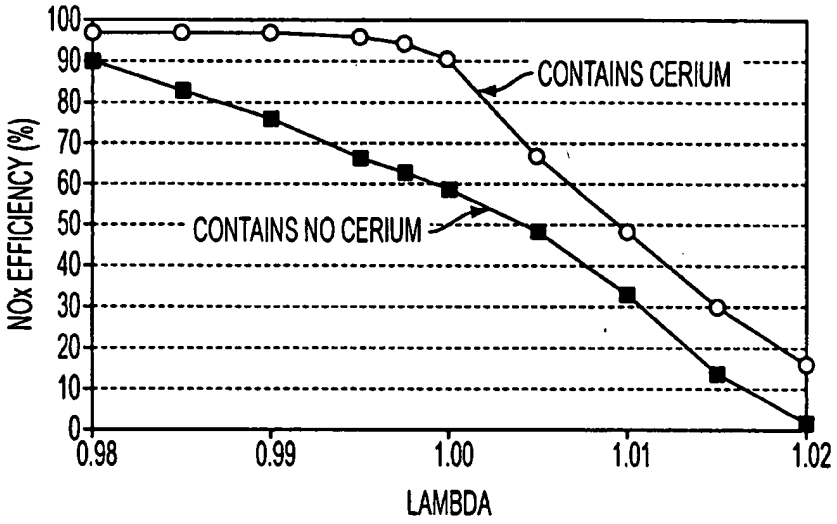

FIG. 4

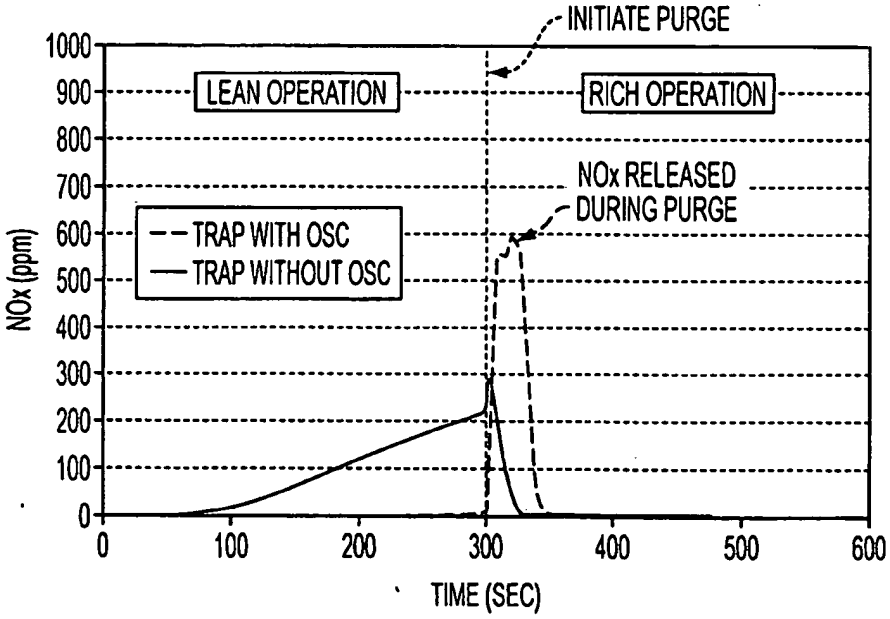

FIG. 5

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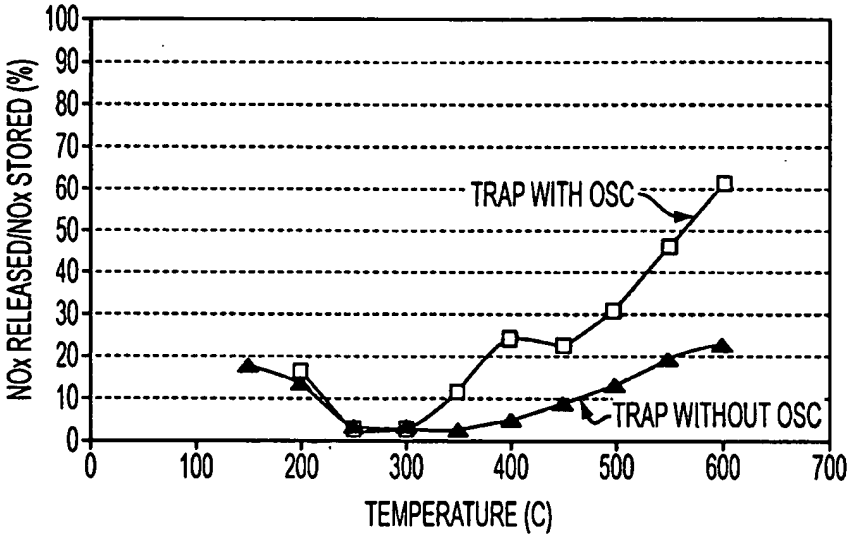

FIG. 6

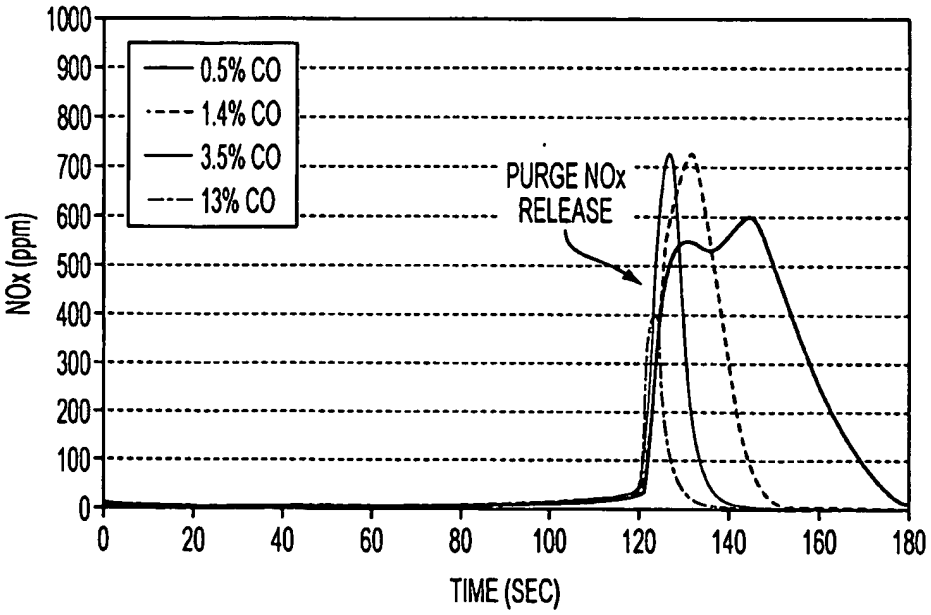

FIG. 7

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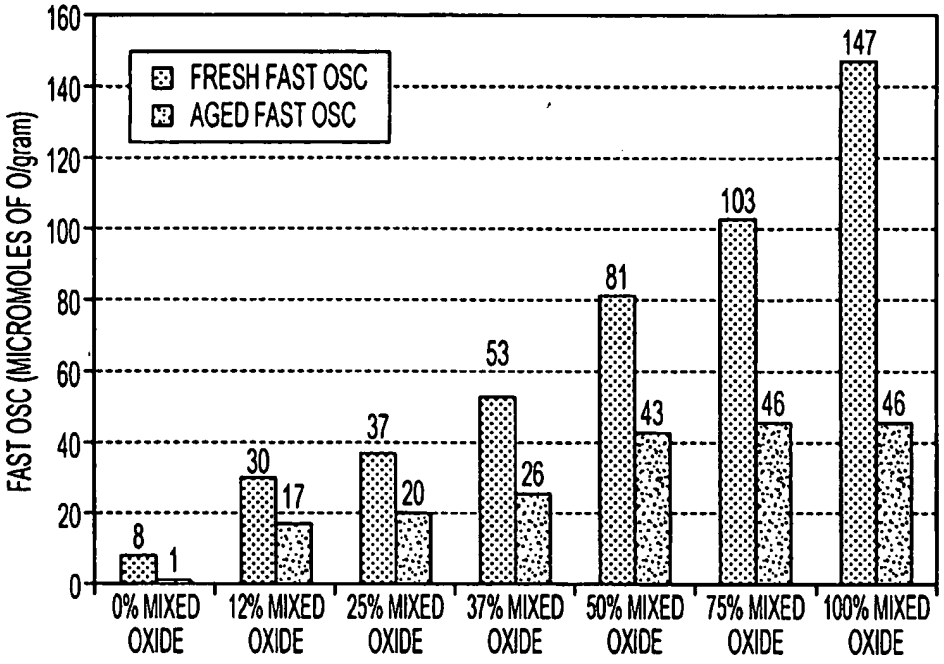

FIG. 8

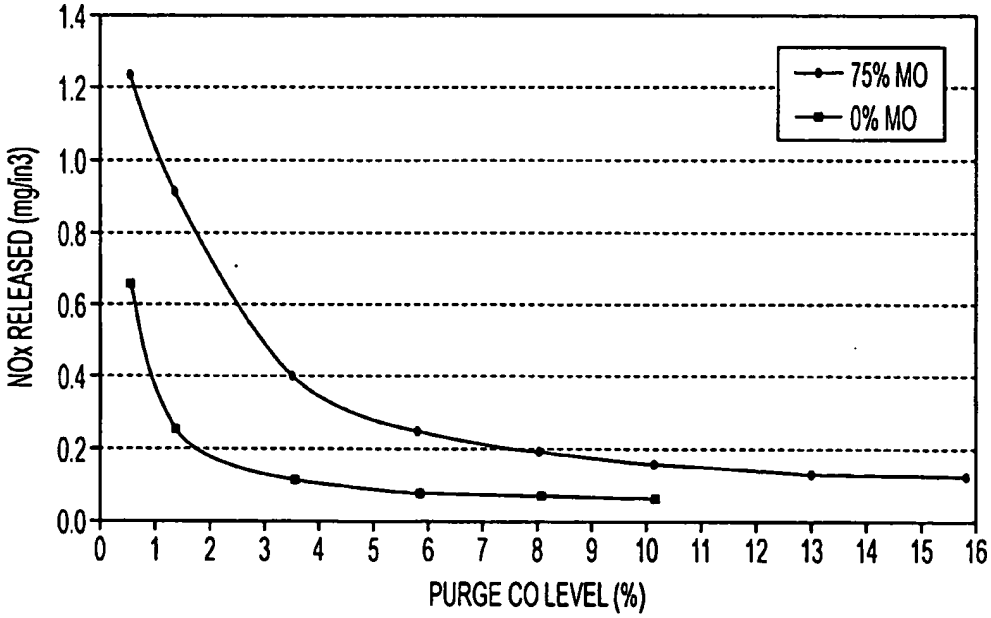

FIG. 9

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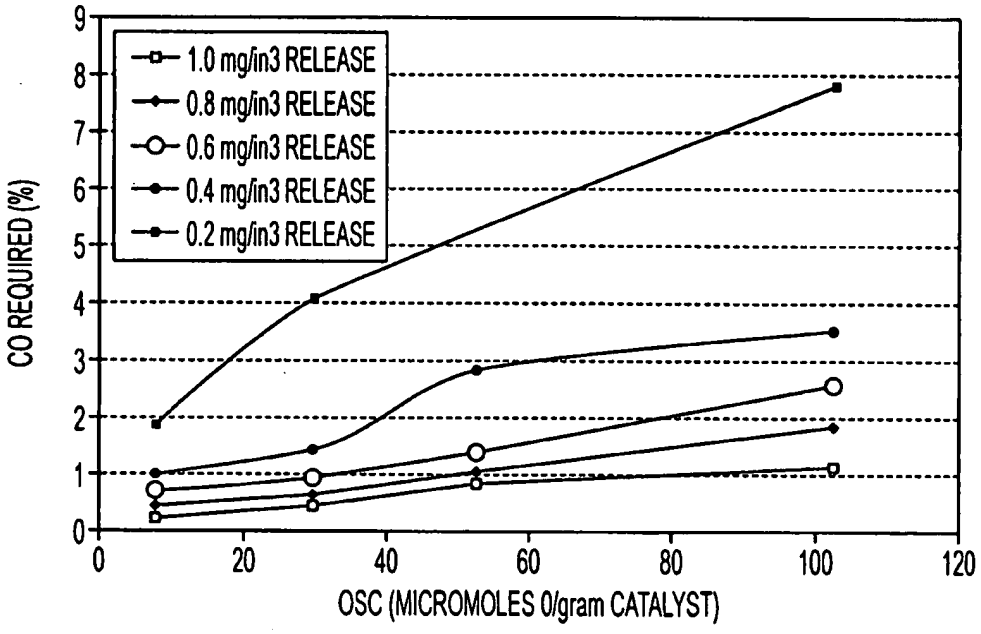

FIG. 10

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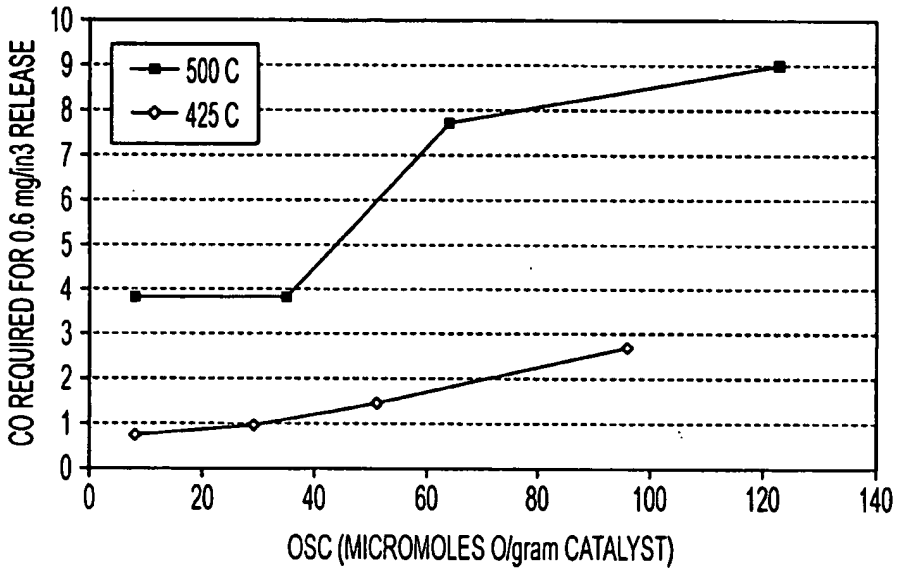

FIG. 11

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